BlueRS+

Bluetooth Serial Adapter

User manual

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1 Introduction

We are very pleased to see that you have bought a Stollmann product and would like to express our appreciation.
This documentation is valid for the following models of the BlueRS+ product family

- **BlueRS+MF5** (plug on module, antenna internal, 5V DC)
- BlueRS+MF3 (plug on module, antenna internal, 3.3V DC) on request
- BlueRS+MS5 (plug on module, antenna external, 5V DC) on request
- BlueRS+MS3 (plug on module, antenna external, 3.3V DC) on request
- **BlueRS+DF** (desktop model, antenna internal)
- BlueRS+DS (desktop model, antenna external) on request

- **BlueRS+MF5/C1** (class1 plug on module, antenna internal, 5V DC)
- **BlueRS+DF/C1** (class1 desktop model, antenna internal)

- Software versions V1.124.003 or later

1.1 Product description

The RS+ is an Bluetooth adapter with the following functions.
- The BlueRS+ connects devices with a **serial port** to any Bluetooth link. It gives access to other devices situated in the same Bluetooth area (piconet).
- Data can be transmitted with the following rates:
  - limited by the baudrate of the serial link from 1200 up to 230400 baud.
- The connected serial device can drive the BlueRS+ by using
  - asynchronous AT commands
  - automatic connection setup

The following profiles are supported:
- One serial profile for transparent data communication through the Bluetooth link.
- A second serial profile for management access from another Bluetooth device using a Bluetooth link.

BlueRS+ may be used in two product versions:
- The BlueRS+ **module** may be integrated into different devices and connects them with the Bluetooth interface via a serial TTL/CMOS compatible interface. These modules are referenced as **BlueRS+Mxx** in this document and represents the product types BlueRS+MF5, BlueRS+MF3, BlueRS+MS5, BlueRS+MS3.
- The BlueRS+ **Desktop** device is an external device that connects the terminal equipment with the Bluetooth interface via a serial V.24 / RS-232 interface.

These devices are referenced as **BlueRS+Dx** in this document and represents the product types BlueRS+DF, BlueRS+DS.

Please refer Appendix A1: for information about the differences.

1.2 Safety

The BlueRS+ is conform to the European safety requirements IEC 60 950. Please use only the delivered power supply or an original replacement from Stollmann.

The homologation for the Bluetooth compatibility tests according the Bluetooth standard V1.1 has been started.

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2 Installation

2.1 Contents

This packet contains the following items:

- Bluetooth Serial adapter BlueRS+
- Mains plug power supply adapter (only BlueRS+Dx)
- DTE interface serial cable (only BlueRS+Dx)
- This user manual

2.2 Installation procedure

The following installation procedure is typical for the desktop model BlueRS+Dx. For all plug in modules the installation is dependent on the overall system and has to be referred there.

Desktop model only:

To start using the BlueRS+Dx, please follow these steps:

- Connect the serial port (DTE) of the BlueRS+ to the serial port (COM-port) of a PC or other serial terminal equipment by using the supported DTE interface serial cable.
  Please make sure that the COM-port of the PC is not used for other purposes or by other communication programs.
- Connect the power supply to a standard AC outlet. Please reference to page 4 for selecting the correct plug for interfacing.
- The green LED on the BlueRS+Dx front panel will come on to indicate that the device has been power up. After some seconds the green LED will start blinking to indicate power save mode.

- Optionally: Configure the BlueRS+Dx Bluetooth interface if needed.
  Configuration is required especially if you want to automatically connect to another Bluetooth device (set up the remote Bluetooth address).

The BlueRS+ is now ready for use with Bluetooth links, please refer to the next chapter for the configuration to use the terminal equipment together with the BlueRS+.

2.3 Displays and control elements BlueRS+MF5 desktop model

For interfacing the module version please refer to the appendix.
At the back of the BlueRS+ you will find the connectors for the following devices:

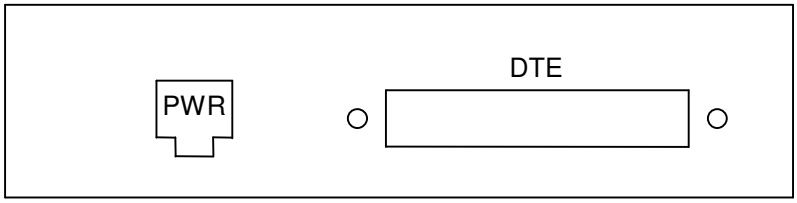

Fig. 2: Back view of the desktop model BlueRS+

PWR: external power supply (5V DC)
DTE: V.24 interface for DTE, i.e. a PC

You can control the status of the BlueRS+ via two LEDs at the front side.

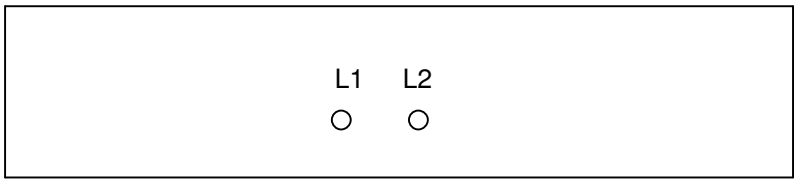

Fig. 3: Front view of the desktop model BlueRS+

Both of the LEDs, **L1** (green) and **L2** (yellow)**,** show the overall status of the BlueRS+ in coded form. The following list describes the view for an error free power on sequence of the BlueRS+.

	Status	**L1**	**L2**	
1.	Power-On-Phase, Bootloader, wait	⊖	⊖	(about 2 sec)
2.	Power-On-Phase, Initializing, wait	⊖	○	(about 10 sec)
3.	Ready, Initialization ok	⊗	○	
4.	Ready, Initialization ok, power save	∅	○	
5.	Connected, Bluetooth link established	⊗	⊗	

LED Legend: ⊗ On, ○ Off
⊖ Continuously blinking, ∅ flashing
A complete list you can find in the appendix "LED displays".

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3 Using the BlueRS+

Before using the BlueRS+ the address of another Bluetooth device has to be selected - if not predefined by factory – that shall be the communication partner in the Bluetooth link.
The compatible devices can be scanned using the configuration command "bdinq". From that list one Bluetooth device has to selected.
If you are using an automatic connecting mode that Bluetooth address has to be entered and stored using the configuration command "brad" (see BlueRS+Configurator activation on page 23).

You can select different operation modes for the BlueRS+. These operating modes are used to control Bluetooth links and to configure the BlueRS+.

Supported operating modes:
- Automatic connecting deriving from DTR or always connected.
- Automatic accepting of incoming connections.
- Asynchronous mode for devices that need the AT command set.

You can configure the BlueRS+ in the following ways:
- by using BlueRS+Configuration commands entered by the locally connected PC.
- by using the AT command set entered by the locally connected PC.
- by using BlueRS+Configuration commands entered via the Bluetooth link (remote configuration).

3.1 Automatic connection establishment

Automatic connection establishment is available in the following modes:

- An automatic connection will be initiated when control line DTR is on.
- An automatic connection will be initiated when transmit data is received from the DTE device. All data received before the Bluetooth connection is established will be buffered inside the BlueRS+ and automatically sent via the Bluetooth link.
- An Automatic connection will be initiated independent of any status line – automatically after power up and initialization.
- No connection establishment initiated by this module. Bluetooth connection requests from other Bluetooth devices will be automatically accepted (if compatible).

To enable automatic call you have to set BlueRS+Configuration parameter "*cmds*" to 6, 7, 8 or 13 (see below).
An established connection will be indicated by a status line (default: DCD). See also configuration commands "*cdcd*" and "*cdtr*".

If a connection cannot be established successfully an automatic retry will be started. The duration of trying to establish the connection and the pause for next retry can be configured.

The Bluetooth device to be accessed is taken from the parameter "*brad*", it has to be set up to the Bluetooth device address of the remote Bluetooth device. Additionally the server channel has to be set up if not fitting to the default (1), see parameter *brsch*.

cmds 6	Automatic connection establishment when DTR is ON.
cmds 7	Automatic connection establishment when transmit data are received by the BlueRS+.
cmds 8	Automatic connection establishment independent of any status line.
cmds 12	No connection establishment initiated by this module.
cato *n*	call abort of a not successful call after *n* seconds. *n*={3..255}, default: **15** seconds.
capa *n*	call pause for *n* seconds before next call attempt. *n* = 0 : no call retry. *n*={0..255}, default: **3** seconds.

Hint: The configuration command "*idle*" can be used, to automatically disconnect after a predefined time without data transmission.

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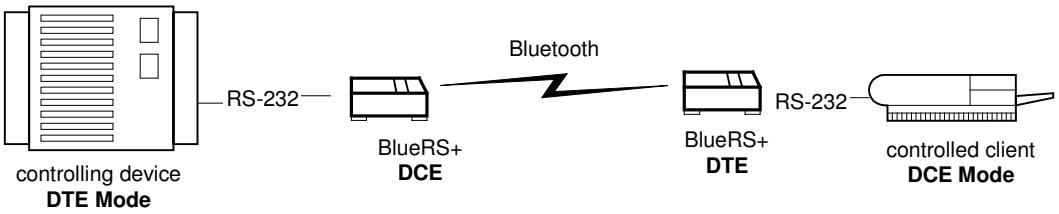
Example:



Setting of BlueRS+ **DCE:**
cmds=8
brad= boad of BlueRS+**DTE**

Setting of BlueRS+ **DTE:**
cmds=12

Don't forget to set the baudrate to the correct setting.

3.2 AT command set for BlueRS+

All parameter can be changed by using an extended AT command set described in this chapter.
Please check if the factory setting will fit with your environment. The factory setting is described (highlighted) in the parameter list below.

If you want another configuration as set in the factory default setting, please do the following steps:

- Connect the PC's com-port to the DTE interface of the BlueRS+.
- Connect the power supply to the mains socket.
- Start a terminal emulation on your PC, please verify that the baudrate setting of the terminal emulation fits those of the BlueRS+.
- Set up the parameter of the BlueRS+ from the terminal emulation and save the parameter using the AT command set.

  Example:
  To change the access mode to restricted please enter the following commands:

  ATBRESTR=1**<↵> (set restricted mode to ON)
  AT&W<↵> (store the new configuration)
- Leave your terminal emulation and start your application program.

With the exception of the command **A/** (Repeat command) all commands begin with the prefix **AT** and are terminated with <↵>. Corrections in a command line are done with <BACKSPACE>. A command line has a maximum of 80 characters. The command line is automatically cancelled by longer input. Blanks are ignored, capital/small letters are not significant.

The parameter settings of the BlueRS+ obtained when using the AT commands can be permanently stored (AT&W) and are not lost by resetting or by leaving the AT command mode.

To enter the AT command mode during an active data connection you must use the following sequence ("Escape sequence"):

at least 1 sec pause **<+><+><+>** 1 sec pause

The time gap between all three plus signs may not exceed 1 sec.
The escape sequence is transmitted transparent to the remote device.

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By using initialization strings to configure the TA which includes more than one parameter to be configured please follow the examples below:

- Initialization string includes standard AT commands:
  AT&F&D2&C1E0&W

By using a special configuration command (at**<cmd>) in the initialization string you have to set a semicolon <**;**> in case that additional commands will follow.

- Initialization string includes special AT commands:
  AT&F****BR=8;**&D2&C1E0&W

Supported commands:

A/ Repeat last command line

This command repeats the commands of the last entered command line.
Note: No prefix **AT** is required.

A/

A Accept incoming call

Using this command you can accept an incoming call, if automatic call acceptance is not set (Register S0 = 0). An incoming call is always displayed by the message “RING“ or the code “2“, also if automatic call acceptance is selected.
Must be the last command in an AT command line.

CONF Enter BlueRS+Configurator

Enters directly into the BlueRS+Configurator, the configuration prompt "#" will be displayed. Leave the BlueRS+Configurator with the command "quit" (or “exit” or “go”).

ATCONF

&C DCD control

Selects the behavior of the DCD control line from the BlueRS+.

AT&C	BlueRS+ control line DCD is always ON
AT&C1	DCD ON indicates Bluetooth connection is established (default)
AT&C2	DCD line follows DTR
AT&C4	DCD follows remote DCD

D Initiate Bluetooth link

This command addresses a Bluetooth device directly through it's address or name.
If a connection to a Bluetooth device requiring the restricted mode the pin has to be set up using command AT**BPIN.
The link request will time out, if the Bluetooth address is not valid (about 6 seconds).

ATD <brad>|*dx*

brad: called Bluetooth remote device address (12 digits)

dx: references called Bluetooth remote device service number in bdlist (d1..d9).

This command must be the last command in an AT command line.
Any character input while the RS+ is dialing will cancel the dialing procedure.

Examples:

ATD 0080371443AB	Connect to Bluetooth device 0080371443AB
ATD d1	Connect to 1st Bluetooth device in *bdlist* (server channel number defined in *brsch*)

Note:

The remote Bluetooth device has to be determined before issuing this link request. This can be done in the following ways:

- get it manually by reading from the sticker of the remote Bluetooth device.
- Inquire the address and service by using the commands AT**BDINQ and AT**BDLIST.

Give the BlueRS+ about 10 seconds after Reset to initialize before issuing the first command.

&D DTR control

Selects the behavior of the BlueRS+, when the DTE control line DTR changes from ON to OFF.

AT&D	DTE control line DTR setting is ignored
AT&D2	DTE control line DTR is evaluated: dropping the DTR line by the DTE will disconnect an existing Bluetooth link. An incoming call will be accepted only with DTR active.
AT&D4	DTE control line DTR is partly evaluated: - dropping the DTR line by the DTE will disconnect an existing Bluetooth link (default). - An incoming call will be accepted independent of DTR status.

E Local echo

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Selects the local echo in command mode.

ATE No local echo
ATE1 Local echo on in command phase (default)

&F Load factory defaults

Factory default will be loaded. (for storing in non volatile memory please use the command AT&W).

AT&F setup all parameter concerning data port.
AT&F1 setup all parameter including Bluetooth specifics and passwords.

H Disconnect

Disconnects existing Bluetooth connection, after issuing the escape sequence (see page 8).

ATH

I Display version information

Displays different information about version number and settings:

ATI Returns the "Modem"-type; name of the terminal adapter (“BlueRS+“)
ATI1 Returns "0"
ATI2 Returns "OK"
ATI3 Returns version string: "V1.xyz"
ATI4 Returns manufacturers name: "Stollmann E+V GmbH"
ATI5 Returns "OK"
ATI6 Returns copyright string: "(c) Copyright Stollmann GmbH"
ATI7 Returns "OK"
ATI8 Returns "ERROR"
ATI9 Returns "OK" (Plug&Play ID-Request not supported)
ATI77 Returns Bootloader version string
ATI99 Returns software creation date

&K Flow control

Selects the flow control behavior of the BlueRS+ while in data communication phase.

AT&K No local flow control between the DTE and BlueRS+ is used
AT&K3 Local flow control is set to hardware handshake RTS/CTS (default)

AT&K5 Local flow control is set to hardware handshake RTS/CTS additionally in AT command phase

O Return to online state

If the BlueRS+ is in command mode after issuing an escape sequence out of an existing connection, ATO brings the BlueRS+ back to data phase.
Must be the last command in AT command line.

ATO

Q Suppress results

With this command result codes or messages can be suppressed.

ATQ Returns status - codes after command input (default)
ATQ1 No result codes are returned

&R CTS control

Selects the behavior of the CTS control line from the BlueRS+.

AT&R BlueRS+ control line CTS is following all changes of RTS
AT&R1 CTS is always ON (default)
AT&R2 BlueRS+ control line CTS is following all changes of DTR
AT&R3 BlueRS+ control line CTS is following all changes of remote CTS (set for cable replacement)

S Display and set internal S register

ATS*nn*? Show actual values (decimal) of selected register *nn*
ATS*nn*=*xxx* Set selected register *nn* to the decimal value *xxx*.
See S register definitions on page 20.

&S DSR control

Selects the behavior of the DSR control line from the BlueRS+.

AT&S BlueRS+ control line DSR is always ON (default)
AT&S1 DSR ON indicates Bluetooth link is established
AT&S2 BlueRS+ control line DSR is following all changes of DTR
AT&S3 BlueRS+ control line DSR is following all changes of DCD
AT&S4 BlueRS+ control line DSR is following all changes of remote DSR (set for cable replacement)
AT&S5 reserved

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V Result format

ATV Result is presented as numbers (followed by <↵>)
ATV1 Result is presented as text (default)

&V Display configuration

AT&V Displays the actual configuration of AT command setting
AT&V1 Displays the actual configuration of extended AT command setting

W Extended result codes

ATW Result is presented without extended result codes.
ATW1 Result is presented with extended result codes, Result messages include error causes.

&W Store active configuration

The active configuration will be stored in non volatile memory.
AT&W

Z Load stored settings

The active configuration will be reset to the stored configuration.
Must be the last command in an AT command line.
ATZ

****DBITS** Number of data bits *x* asynchronous chars (7,**8**)

Number of data bits *x* for asynchronous character (7,default: **8**).
AT**DBITS=*x*
Note: only valid for br <> 0.

****PRTY** Set parity of asynchronous characters

Selects the parity for asynchronous characters.

0: no parity; 1: even parity; 2: odd parity

ATPRTY=0**	No parity (default)
AT**PRTY=1	Odd parity
AT**PRTY=2	Even parity
AT**PRTY=3	Space parity
AT**PRTY=4	Mark parity

Notes: To use other data formats than 10 bit (= (N1, 7E1, 7O1) you have to set br to fixed speed.
- only valid for br <> 0.

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3.2.1 Bluetooth specific AT commands

Setting up special Bluetooth parameter:

****BACCTAB**	Show pairing information

To show the pairing information (setup due to a successful restricted connection) within the BlueRS+ you have to issue the command "AT**BACCTAB" .

Example: at**bacctab
Response: 1: used: YES BD: 00803714ECA4 name:
OK

****BDEL**	Delete pairing information

To delete the pairing information (setup due to a successful restricted connection) within the BlueRS+ you have to issue the command "AT**BDEL 1" . The paired Bluetooth device can be read out by the command "AT**BACCTAB".

Example: at**bdel 1
Response: OK

****BDINQ**	Inquire Bluetooth devices

With this request the automatic scan of all discoverable Bluetooth devices will be initiated.
As a result the creation of the list *bdlist* will be initiated. The list can be read out using the command at**bdlist. If the Inquiry-scan has not been terminated while issuing the command at**bdlist, the BlueRS+ will return "inquiry active".
The entries contain the Bluetooth device address, the Bluetooth device names and available services (profiles).
The creation of this list may take up to 20 seconds due to the reaction time of the accessible Bluetooth devices, a maximum of 9 Bluetooth devices can be listed.
When issuing the command "at**bdinq 1" the inquiry scan will only request the Bluetooth addresses, name and service inquiry will not be performed. The maximum waiting time for responses of the Bluetooth devices is limited by a time defined with the command "at**binqtim".

Example: at**bdinq request Bluetooth devices with name and service.
Response: OK
at**bdinq 1 request Bluetooth device addresses only
Response: OK

****BDLIST** Show inquired Bluetooth devices

With this request the list of found Bluetooth devices will be returned, the entries show the Bluetooth device address and the Bluetooth device name requested by the command *at**bdinq*. For every Bluetooth device in addition the available services (profiles) will be shown.
These entries can be accessed by the selectors *d1 .. dn* to address the Bluetooth device and the selectors *s1 .. sn* to address the Bluetooth devices service channel.

Example: at**bdlist
Responses: d1: <bradr1>, <bname1>
s1: <service1>, <server channel>, <bsname1>
s2: <service2>, <server channel>, <bsname2>
d2: <badr2>, <bname2>
s1: <service1>, <server channel>, <bsname3>
OK
or
inquire active ; if the search initiated by at**bdinq
OK ; is still active
or
list empty ; no Bluetooth device found
OK

brad found Bluetooth remote device address (12 digits)
bname found Bluetooth remote device name
service coding of service type
server channel used channel number for service type

****BINQTIM** Timeout for Inquiry Scan

With this command the Inquiry Scan time will be limited to the configured value (default: 8 = 10 seconds). See also command at**bdinq.
Allowed values: 1 to 48 (1,25 sec to 60 sec).

Example: at**binqtim=*n* set maximum wait time to *n* * 1.25 seconds
at**binqtim=2 set maximum wait time to *2*.5 seconds

****BNAME** BlueRS+ own device name

Defines the device name. bname is shown on a remote Bluetooth terminal device during a Service Discovery sequence It is a string constant according

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to V.250.

Example: at**bname show own device name
at**bname=*<rs+name>* set own device name to *rs+name*

****BRAD** Bluetooth Device Remote Address

With this command you can setup the Bluetooth address of the other Bluetooth device, that should be connected using an automatic link setup.

Example:
AT**BRAD=0080371443AB

****BRNAME** Displays connected device name

Displays the device name of the connected Bluetooth device.
This value is can not be changed.

Example: at**brname show connected device name

****BRSCH** Set remote Bluetooth server channel

Set up server channel of the remote Bluetooth module, to that the Bluetooth link shall be established.
The own server channel number is fixed to 1, only used for accepting Bluetooth links.
Remote management between BlueRS+ is achieved using the server channel 30.

default: **1**

Example: at**brsch=1

****BSNAME** BlueRS+ service name

Defines the service name of the BlueRS+. bsname is shown on a remote Bluetooth terminal device during a Service Discovery sequence.

Example: at**bsname
at**bsname=*<rs+srvname>* set own device name to *rs+srvname*
default: "BlueRS+ serial port"

Note:

To activate a new name for discoveries you have to make a power off/on cycle.

****BRESTR** Set restricted mode

Control the restricted mode for exchanging the Pin (Passkey). When set to 1 the setting of parameter bpin will be used to verify a pin with the requesting Bluetooth device.
The pins of two bluetooth devices have to set to the same value, if one of these devices allows only restricted connections. If a restricted connection has been established one time between two Bluetooth devices these devices know each other and are called as "paired" (see command "AT**BACCTAB" for information about the paired Bluetooth device).
After a pairing has taken place Bluetooth links can be established between these paired devices independent of the setting of the restricted mode!
To delete the pairing information within the BlueRS+ you have to issue the command "AT**BDEL 1" .

****BPIN** Bluetooth device Pin (Passkey)

Set the Pin for establishing a connection in the restricted mode by the command "AT**BPIN=<old_pin>,<newpin>".
This Pin is always checked if

- the BlueRS+ is set to restricted mode
- the BlueRS+ is not set to restricted mode and the other Bluetooth device is set to restricted mode.

The Pin has a fixed length of 4 digits, factory default: **0000**.
To reset the Pin to factory default please use the command AT&F1 (all parameter will be set to factory default.

Example: at**bpin=0000,1234 set Pin to 1234 (old Pin was 0000)

Note: After a pairing has taken place (Pin sucessful exchanged) Bluetooth links can be established between these paired devices independent of the setting of the restricted mode and the Pin!

****BOAD** Bluetooth Device Own Address

With this command you can read out the own Bluetooth device address.
This value is can not be changed.

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Example:
AT**BOAD

****<*cmd*>** Execute configuration command

Executes one configuration command, for definition of commands see page 26.
AT**<*cmd*>
More than one configuration command have to be separated by a ";".
AT**cmd1;**cmd2

3.2.2 AT command S register set

S0 0: No automatic call acceptance, acceptance of an incoming call is controlled by the data terminal (command ATA after RING)
1: Immediate call acceptance by the terminal adapter (default)
2..*n*: Call acceptance through the terminal adapter after *n* "RING" messages.
S2 Escape Character (default = 43h)
S3 Carriage Return Character (default = 13)
S4 Line Feed Character (default = 10)
S5 Backspace Character (default = 08)
S7 Wait time for Carrier (sec) (default = 30 sec)
S9 Enable PNP functionality for Windows95 (default=1, enabled)
S91 **0**: default
1: all unknown AT commands will be answered with OK.
2: Windows 2000 compatibility: some AT commands will be answered with OK, unknown AT commands will be answered with OK.

3.2.3 AT result codes

Result codes (numerical and verbose):

Code	Text	Meaning
0	OK	Command completed
1	CONNECT <*radr*>	Connection established
2	RING <*radr* >	Indicates an incoming call (Link request received)
3	NO CARRIER <*berr*>	No synchronization (*berr* = BT error cause)
4	ERROR	Illegal command or error that can not be indicated otherwise
6	NO DIALTONE <*berr* >	No access to Bluetooth? network (*berr* = BT error)
7	BUSY < *berr* >	Number engaged (*berr* = BT error cause)
8	NO ANSWER < *berr* >	No connection; addressed Bluetooth device can not be reached (*berr* = BT error cause)

Error cause display:
< *berr* > = BT release (error) cause, hexadecimal
Example: NO CARRIER <0104>

In AT command mode, error cause display (does not belong to the AT command standard) can be turned on by issuing the command ATW1 (default). The shown error causes use the coding defined by the Bluetooth definition (see page 35).

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3.3 Cable replacement

A pair of BlueRS+ devices can be used to operate as a RS232 cable replacement. Typically one BlueRS+ has to operate as a DCE interface ("BlueRS+DCE", DSU9 female) and the other one as a DTE interface ("BlueRS+DTE", DSUB9 male). These devices have to be ordered with the correct interfaces.

When ordering a pair of BlueRS+ both devices will have the correct setting to operate without changing any parameter. The default behavior is as follows:

- The Bluetooth link is established directly and automatically after powering on from the BlueRS+ operating in DCE mode
- the restricted mode is disabled
- data transfer is transparent set to baudrate 115200 bit/s
- all status lines are transparently transferred to the other device (local flowcontrol is disabled).
- LED2 shows the Bluetooth connection status (ON = link established)

In detail the following settings differ from the factory default setting:

BlueRS+DCE:

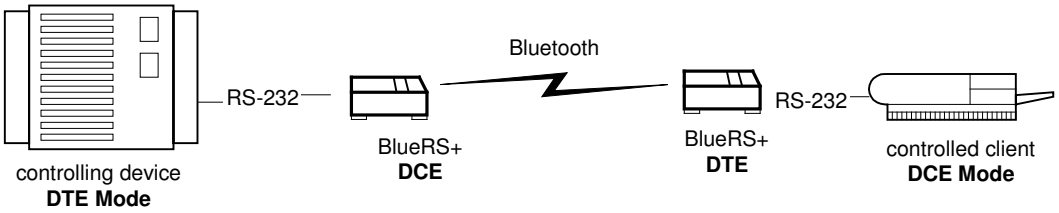
cmds 8	Automatic connection establishment independent of any status line.
cdtr 0	DTR line is not controlling the Bluetooth link
cdsr 4	DSR Output line of BlueRS+DCE follows DSR input line of BlueRS+DTE
ccts 3	CTS Output line of BlueRS+DCE follows CTS input line of BlueRS+DTE
cdcd 4	DCD Output line of BlueRS+DCE follows DCD input line of BlueRS+DTE
cri 1	RI Output line of BlueRS+DCE follows RI input line of BlueRS+DTE
flc 0	no hardware flowcontrol

BlueRS+DTE:

cmds 12	Only acceptance of incoming Bluetooth link requests.
cdtr 0	DSR line is not controlling the Bluetooth link (DTR is mapped internally to DSR)
cdsr 4	DTR Output line of BlueRS+DTE follows DTR input line of BlueRS+DCE (DTR is mapped internally to DSR)
ccts 3	RTS Output line of BlueRS+DTE follows RTS input line of BlueRS+DCE (RTS is mapped internally to CTS)
flc 0	no hardware flowcontrol

Note: to readout the mode of operation of the BlueRS+ please use the command "devmode".
Don't forget to set the baudrate to the correct setting.

Example:



3.4 Table of coding of Bluetooth services

List of Bluetooth services (profiles):

Code	Text	Meaning
1101	**SerialPort**	**Serial port, serial data link without any restriction**
1102	LANAccessUsingPPP	Lan Access with PPP protocol
1103	DialupNetworking	Dial Up Networking to establish switched connections to the ISDN or PSTN
1104	IrMCSync	
1105	OBEXObjectPush	OBEX Object Push
1106	OBEXFileTransfer	OBEX Filetransfer
1107	IrMCSyncCommand	
1108	*Headset*	*Headset access via Bluetooth*
1109	Cordless Telephony	
1100	Intercom	
1111	Fax	Fax
1112	*HeadsetAudioGateway*	*Headset Gateway for audio signals*
1113	WAP	
1114	WAP_CLIENT	

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4 BlueRS+Configurator command set

The settings of the BlueRS+ for the serial interface and the Bluetooth interface are called configuration. The BlueRS+ is delivered with a set of pre-set values. In the following section it will be shown how, by using the configuration commands, you can examine the configuration of the BlueRS+ and if necessary change it. The values can be stored in non volatile memory; this means they'll remain unchanged even if the power supply is disconnected.
You can configure the BlueRS+ in the following ways:

- by using BlueRS+Configurator commands entered by a locally connected PC.
- by using the AT command set entered by a locally connected PC.
- Seite: 23
  by using BlueRS+Configurator commands entered via the Bluetooth link (remote configuration).

The BlueRS+Configurator can be entered in the following ways:

- by entering a special escape sequence (default: "!!!") after initialization independent whether a Bluetooth link is established or not.
- by using a special command from the asynchronous dialup command interface (AT: “ATCONF”).
- Seite: 23
  remote via a Bluetooth connection from another Bluetooth device.
- or escape sequence in power up phase if enabled (rsttim>10, rstmsg=1).

4.1 Configuring the BlueRS+ after power on

- Connect the PC's com-port to the DTE interface of the BlueRS+.
- Start a terminal emulation program (i.e. Hyper-Terminal) with the following settings: 9600 Baud, 8 databits, No Parity **(8N1**)
- Connect the BlueRS+ to the mains by the mains plug adaptor
- Wait until LED 2 starts blinking (after about 5 sec, see config cmd “rsttim“) and the message to enter the config-sequence is displayed:
  "**+++ Press <CR>,<CR>,<ESC>,<ESC> to enter BlueRS+Configurator +++**"
- Type in quickly within 2 seconds after the message appears: <RET> <RET> <ESC> <ESC>, to call up the BlueRS+Configurator.
- The BlueRS+Configurator acknowledges by giving a welcome string and a “#“ as the prompt character. Now you can work with the BlueRS+Configurator by using the configuration commands (see page 26).
- Setup the parameter for the BlueRS+ from your terminal program and store them.
  Example:

To **set** the baudrate to 9600 baud please enter the following commands:

br=4<↵> (set baudrate to 9600 baud)
save<↵> (store the new configuration)
quit<↵> (leave the BlueRS+Configurator and activate the new value settings)

Hint: The active set of parameters can be displayed on screen by the BlueRS+Configurator with the command **"show**<↵>**"**.

- Leave the terminal program and start your application.

Now you can use the BlueRS+ with the new set of parameters by running the needed PC program.

4.2 Configuring the BlueRS+ with AT commands

To execute one BlueRS+Configuration command *cmd* out of the AT command mode you have to issue the command: "at**_*cmd*" .
To call up the BlueRS+Configurator please use the command "atconf".
You can leave the BlueRS+Configurator by the command "quit" (or „exit" or „go").

4.3 Remote Configuration using the TA+Configurator commands

The BlueRS+ to be configured is referred here as "*remote* BlueRS+".
The BlueRS+ to configure is referred as "*local* BlueRS+".
Please make sure that the *remote* BlueRS+ to be configured at the other end is powered up.

- Connect the PC's com-port to the DTE interface of the *local* BlueRS+.
- Connect the power supply to the mains socket.
- Start a terminal emulation program (i.e. Windows-Terminal)
- Configure the *local* BlueRS+ with the special service channel 30 (brsch=30).
- Set up a Bluetooth-Link to the *remote* BlueRS+ to be configured by using the command: ATD<*brad*><↵>.
  The called BlueRS+Configurator acknowledges by requesting the remote password. Please enter the correct password (default: no password, just return). Now you can work with the BlueRS+Configurator by using the BlueRS+Configurator commands (see page 23).
- Configure the parameter for the *remote* BlueRS+ from your terminal program and store them (if wanted). (see page 26).

  Hint: The active set of parameters can be displayed on screen by the BlueRS+Configurator with the command **"show**<↵>**"**.

If necessary the *remote* BlueRS+ can be reset using the command **"reset**<↵>**"**.

- Hang up the Bluetooth connection by leaving the BlueRS+Configurator using the command **quit**.
  Leave your terminal program. After the next reset the changes will be active.
- Restore the server channel to the desired value, default to 1 (brsch=1).

Now the configured *remote* BlueRS+ with the new set of parameters can be used by running the needed PC program.

4.4 List of BlueRS+Configurator commands

The BlueRS+Configurator commands typed in must have the correct syntax and be complete, including all blanks. Capital/small letter use is not important. The entry is not case sensitive.
The bolded values are factory defaults. The usage is:

[?]<command>[=parameter]

Example to **set** the baudrate to 9600 baud:

br=4

Example to **show** the selected baudrate:

br

Example to **show all** selectable baudrates:

?br

To get an overview about the commands of your BlueRS+ some major commands here as a preview:

show	show the usually used parameter
showall	show all changeable parameter
quit	leave BlueRS+Configurator
help	show all available commands
defa 1	setup factory default parameter set
save	store parameter non volatile

---

at.s*x* **AT command parameter set**

AT command set only:
Handle AT specific settings.
Show and change AT S registers by entering the new value.

at.s0	show setting of S0-Register
at.s0=1	set Register S0 to 1

---

boad Bluetooth Device Own Address

With this command you can read out the own Bluetooth device address.
(read only)

Example:

boad

---

bpin Bluetooth device Pin (Passkey)

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Set the Pin for setting up a connection in restricted mode.

br **baudrate asynchronous**

Selection of the asynchronous baudrate for the DTE interface
0: autobauding (only BlueRS+C1)
1: 1200 bit/s
2: 2400 bit/s
3: 4800 bit/s
4: 9600 bit/s
5: 19200 bit/s
6: 38400 bit/s
7: 57600 bit/s
8: 115200 bit/s (default)
9: 230400 bit/s
20: 300 bit/s
21: 600 bit/s

brad Bluetooth Device Remote Address

With this command you can setup the Bluetooth address of the other Bluetooth device, that should be connected using an automatic link setup.

Example:
brad=0080371443AB

brestr Set restricted mode

Enable and disable the restricted mode with exchanging the Pin (Passkey).

brfhigh Set rf power transmission mode

Enables and disable maximum power transmission. Maximum power transmission is defined by parameter brfmax (the parameter is not visible and not changeable).

brfhigh=0	BlueRS+ is working with lower power transmission (class2)
brfhigh=1	BlueRS+ is working with highest power transmission (class1)

Note: This parameter is only valid for the class 1 module.

cato **call timeout to abort**

Time to abort a call if not successful connected after *n* seconds.
n = {3..255}, default: **15** seconds.

capa **call pause**

Automatic call: set a call pause for *n* seconds before next call attempt.
n = 0 : no call retry, default: **3** seconds.

ccts **CTS control**

CTS control
0 : CTS follows RTS
1 : CTS always ON (default)
2 : CTS follows DTR
3 : CTS follows remote CTS line status

cdcd **DCD control**

DCD control
0 : DCD always ON
1 : DCD indicates a Bluetooth connection (default)
2 : follows DTR
4 : follows remote DCD

cdsr **DSR control**

DSR control
0 : DSR always ON (default)
1 : DSR indicates a Bluetooth connection
2 : DSR follows DTR line status
3 : DSR follows DCD line status
4 : DSR follows remote DSR line status

cdtr **DTR control**

Usage of DTR to control a Bluetooth connection
0 : No control:
Incoming calls will be accepted independent of DTR status;

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DTR drop does not disconnect an active connection.
2 : DTR off disconnects
Incoming calls will be accepted only when DTR is ON;
DTR drop disconnects an active connection.
4 : DTR ignore and DTR drop disconnects (default)
Incoming calls will be accepted independent of DTR status;
DTR drop disconnects an active connection.

cmds **command set** ***(note 1)***

Command set for connection control
0: AT command set (default)
6: Automatic connection establishment when DTR is ON.
7: Automatic connection establishment when transmit data are available.
8: Automatic connection establishment independent of any status line.
12: No connection establishment initiated by this module.

Note: For details see the appropriate chapters.

cpua, cpua2, cpl3 **Output pin behavior (BlueRS+ module only)**

(under development)
Definition of the behavior of the output pins UA UA2 and L3 of BlueRS+.
The behavior can be configured by using one of the following setting to the value of the list below.
The output level can be inverted by adding 128 to the desired value (defines the output pin to low active).

0: always OFF. **Default UA, UA2, L3**
1: always ON
29: Bluetooth link established, same as DCD on V.24.

cri **RI control**

RI control
0 : RI is set with an incoming Bluetooth link request (default)
1 : RI follows remote RI line status

defa **default settings**

Sets up factory default parameter setting.
defa 0: setup all parameter concerning data port
defa 1: setup all parameter to factory defaults including Bluetooth parameter.

devmode **device mode strapping**

Shows the mode of operation of the BlueRS+: DTE or DCE mode.
When selecting DTE mode two additional inputs are evaluated and mapped to the behavior of DCD (Pin 18) and RI (Pin 11).

0 : DTE mode
1 : DCE mode

Note: If you are working in DCE mode using the plug-on module, please make sure, that PIN20 of connector P1 is connected to GND.

dbits **asynchronous databits**

Number of data bits asynchronous chars (default: 8) 7,**8**

Note: To use other data formats than 10 bit (8N1, 7E1, 7O1) you have to set br to fixed speed.

flc **flowcontrol**

Flowcontrol to DTE
0 : No flowcontrol
3 : Hardware flowcontrol RTS/CTS (default)
5 : Hardware flowcontrol RTS/CTS additionally in AT command phase

flash **load new firmware**

This commands loads new firmware into the BlueRS+. The actual firmware will be overwritten.
The firmware will be stored into the used part of the flash memory. While uploading the following checks will be performed:

- File transfer protocol is XMODEM1K
- An overall firmware checksum is used.
- The firmware type written in the module header of the firmware must be compatible to the hardware- and allowed firmware type (stored inside the Bootloader).

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This command is available only via the local serial port.

idle **Idle data timeout**

Timer to disconnect the Bluetooth link after inactivity on the serial line (sec).
0: inactive (default)
1..*n***:** delay time to disconnect in seconds (1..255).

load Load stored parameter setting

All parameters stored in non volatile ram will be loaded.

opt **option register for AT register**

option register representing the setting of some AT commands:
bit 0: 1 = echo on, equals ATE1
bit 1: 1 = quiet, equals ATQ1
bit 2: 1 = numeric response, equals ATV0

prty **asynchronous parity**

Parity of asynchronous character (default: no parity)
0 : No parity; 1 : Odd parity; 2 : Even parity, 3 : space parity, 4 : mark parity

Note: To use other data formats than 10 bit (8N1, 7E1, 7O1) you have to set br to fixed speed.

quit, exit, go **activate parameter changes**

Activates the actual parameter settings and leave the BlueRS+Configurator (without storing the parameter in non volatile memory).

reset **reset BlueRS+**

Resets the whole functionality of the BlueRS+ by a forced hardware reset (like Power off / on).
Refer also to parameter rsttim.

rsttim **startup timer**

Startup delay timer after reset. Within this period the configuration can be entered after reset.
1 .. 255 : reset phase in 100 milliseconds, default: **40** (4 seconds)

save **store parameter changes**

Stores the actual set of parameters in non volatile memory

sbits **number of stopbits**

Number of stopbits of asynchronous character
1 : One stopbit (default); 2 : two stopbit

Note: To use other data formats than 10 bit (8N1, 7E1, 7O1) you have to set br to fixed speed.

show **show parameters**

Displays the actual set of parameters

showall **show all parameters**

Displays the all accessible parameters

trc*nnn* **commands for internal trace**

The usage of the commands for internal trace are described in chapter 5.3.

ver **show version string**

Displays detailed information about the software version and BlueRS+ type.

verb **show version string of Bootloader**

Displays detailed information about the software version of the Bootloader.

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<cmd>?	**more information for one command**

Displays the allowed values for one selected command *<cmd>*

??	**help**

Displays help texts for all commands

Notes:

4.5 Software update

The BlueRS+ uses a Flash-EPROM for software updates to store the operational software. This software can be updated from a local connected PC via the COM port or via an remote configuration connection. Please fulfill the following steps to update the BlueRS+:

- Get a new software release for the BlueRS+ from your supplier or http://www.stollmann.de/ or ftp://ftp.stollmann.de/ and copy it to your PC.
- Start a terminal emulation on your PC with the capability to run an X-MODEM-1K file transfer (i.e. HyperTerminal).
- Local update: enter the BlueRS+Configurator.
- Enter the BlueRS+Configuration command "flash".
- Wait for end of erasing the Flash-EPROM and the prompt to start your X-MODEM transfer.
- Start the 1k-X-MODEM file transfer (send file or upload) by selecting the Transfer / Send File menu point in your terminal emulation and select the new software.
- After completion you will get the information whether the software update ended successfully or erroneous.
- The loaded new firmware will be activated automatically.
- Due to new functionality the last stored configuration setting may be lost, please check before using.

For more details refer to the description of the commands flash in the chapter ”List of BlueRS+Configurator commands” on page 26.

Note:

Due to an error it may be that no firmware is active within the BlueRS+. This will be indicated by continuous flashing of the LEDs L1, L2 (Bootloader active). To store a new firmware correctly you have to enter the command at**flash and load a firmware using the XMODEM protocol as described above. This Bootloader supports only AT**cmd with fixed baudrate of 115.200 Baud.

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5 Diagnostic and error messages

For the diagnostic of erroneous situations the following functionality is supported. Please check first the behavior of LED displays, if an Bluetooth link can not be established. Refer to list of LED displays on page 41.

5.1 Error messages from AT command set

When the extended result messages are selected using the command ATW1 Bluetooth error codes are displayed in addition to the standard AT result messages. Bluetooth error codes are always coded as <xxxx>. The meaning can be taken from the following tables Bluetooth error codes (see page 35).

5.2 Bluetooth error codes

Note: error codes marked with (i) are internal errors.

Error cause hexadecimal	Meaning	Translation to AT result codes
0x0000	no error, no explanation	3
0x0001	driver and application version mismatch	3
0x0002	application id provided is not correct	3
0x0003	unknown message code in message	3
0x0004	not enough resources to complete request (out of descriptor etc)	3
0x0005	at least one parameter of the message is wrong	3
0x0006	no adapter plugged in	3
0x0007	too much outstanding messages in downstream direction	6
0x0008	driver is busy, repeat request later	6
0x0009	error in message transport system (driver not correct installed?)	3
0x0101	(i) HCI_ERR_UNKNOWN_COMMAND	3
0x0102	(i) HCI_ERR_NOCONNECTION	3
0x0103	bluetooth adapter crashed	3
0x0104/260	remote bluetooth device not found (wrong address?, out of range?)	8
0x0105	authentication error(wrong pin code supplied?)	3
0x0106	(i) HCI_ERR_KEY_MISSING	3
0x0107	(i) HCI_ERR_MEMORY_FULL	3
0x0108/264	lost connection to remote bluetooth device (out of	3

	range)	
0x0109	max no of connections exceeded	6
0x010a	max no of voice connections exceeded	6
0x010b	(i) HCI_ERR_ACL_CONN_ALREADY_EXISTS	3
0x010c	(i) HCI_ERR_COMMAND_DISALLOWED	3
0x010d	connection attempt by remote side rejected	3
0x010e	connection attempt by remote side rejected	3
0x010f	connection attempt by remote side rejected	3
0x0110	connection attempt by remote side timed out	8
0x0111	(i) HCI_ERR_UNSUPPORTED_PARAM_VALUE	3
0x0112	(i) HCI_ERR_INVALID_HCI_PARAMETER_VALUE	3
0x0113	connection terminated by remote side	3
0x0114	connection terminated by remote side	3
0x0115	connection terminated by remote side	3
0x0116	connection terminated by local side	3
0x0117	(i) HCI_ERR_REPEATED_ATTEMPTS	3
0x0118	authentication rejected by remote side	3
0x0119	incompatible remote bluetooth adapter	3
0x011a	unspecified error	3
0x011b	(i) HCI_ERR_UNSUPPORTED_LMP_PARAMETER_VAL	3
0x011c	master slave role switch not allowed	3
0x011d	connect lost to remote Bluetooth adapter (link manager)	3
0x011e	(i) (HCI_ERR_LMP_ERROR_TRANSACTION_COLLISION	3
0x011f	(i) HCI_ERR_LMP_PDU_NOT_ALLOWED	3
0x0120	attempt to enable encryption failed	3
0x0121	information: unit key used	3
0x0122	(i) quality of service not supported.	3
0x0123	(i) HCI_ERR_INSTANT_PASSED	3
0x0124	(i) unit key not supported	3
0x0164	(i) HCI_ERR_ILLEGAL_HANDLE	3
0x0165	initialization of adapter failed (timeout)	6
0x0166	initialization of adapter failed (synchronization)	6
0x0201	(i) connection went to state pending	3
0x0202	protocol not supported by remote side	3
0x0203	connection refused due to security conditions	3
0x0204	out of resources	3
0x02ee	remote side timed out	3
0x0301	version of remote SDP entity not compatible	3
0x0302	invalid service record handle	3
0x0303	invalid request syntax	3
0x0304	invalid size of pdu	3
0x0305	continuation state is invalid	3

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0x0306	not enough resources to complete operation	3
0x0364	client received unhandled SDP opcode	3
0x0365	No answer from server(timeout)	3
0x0366	specified service not found	3
0x0367	Syntax Error in Response from server	3
0x0464	Connection setup was rejected by remote side (DM), i.e. the Pin exchange has failed in restricted mode	3
0x0465	Connection timed out (no response)	8
0x0466	Non Supported Command received (incompatible remote side)	3
0x0467	Illegal parameter	3

Note: error codes marked with (i) are internal errors.

5.3 Diagnostic using the internal Trace

For more sophisticated debugging an internal trace functionality is implemented. This logging mechanism allows to write activities of the Bluetooth interfaces and the serial interface into a wrap around buffer. The type of entries can be selected by a trace mask.

trcmsk **set trace mask**

trcmsk *par* Setup the mask to select the type of data to be written into the trace buffer.
Default: Bluetooth HCI and Blueface messages, DTE interface lines, DTE-Data in connection-setup and clearing-phase.
The parameter *par* has to be setup in the following way, all bytes have to be entered (default 00 00 00 00 00 00 00 00 04):

par := bl1 bl2 bl3 dl1 dl2 dl3 sl1 app bt1

bl1	reserved (00)
bl2	reserved (00)
bl3	reserved (00)
dl1	reserved (00)
dl2	reserved (00)
dl3	reserved (00)
sl1	Serial line 1; i.e. first V.24 port; default: **00** bit0: control lines after change bit2: data bytes while connection control (call phase)
app	reserved (00)
bt1	Bluetooth; default: **04** bit0: hci interface, commands and events bit1: hci interface, acl data bit2: Blueface interface: signaling bit3: Blueface interface: traffic while DCD off bit4: Blueface interface: traffic

examples:

trcmsk 000000000000000004 Trace Bluetooth messages and V.24 commands.

trcon **start trace write**

trcon set trace to active regarding to trace mask

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trcoff **stop trace write**

trcoff set trace to OFF independent of trace mask

trcclr **clear trace buffer**

trcclr clear actual trace buffer contents

trcread **read trace buffer**

trcread Output of the complete trace buffer in hexadecimal chars (ASCII, max. line length 72 chars).

Every entry of the trace buffer is output using the following format:
Entry number – Timestamp – Type – Length – Databytes

Entry number	Sequence number of entry
Timestamp	in units of 10 ms
TypeAndSource	Source of traceentry: bit0-7: type from trace mask bit8-14: source of trace entry: bit15: 0xxx : incoming event (from Bluetooth link) 8xxx : outgoing event (to Bluetooth link) “FFFF“ : Reset for firmware
Length	Length of following data bytes
Databytes	Data bytes; continued lines are indicated by an “>“.

Coding of trace data bytes dependent of *TypeAndSource*:

0901/8901: Serial line control line change:
bit0 : 1 = DSR is ON
bit1 : 1 = DCD is ON
bit2 : 1 = CTS is ON
bit3 : 1 = RING is ON
bit4 : 1 = RTS is ON
bit5 : 1 = DTR is ON

6 Appendix

A1: Technical data BlueRS+

BlueRS+ desktop model serial interface:

functional:	V.24
electrical:	V.28
mechanical:	9 pin DSUB connector (female)

BlueRS+ module serial interface:

functional:	V.24
electrical:	TTL
mechanical:	double pin rows P1

Transmission speeds:

DTE:	1200 – 230400 bit/s (asynchronous)

Character representation:	8Bit no Parity, 1 stop bit 7Bit even/odd Parity, 1 stop bit
Character synchronization:	asynchronous
Operating mode:	half duplex or full duplex
Flowcontrol	Hardware (RTS/CTS)
Bluetooth link:	RF part: +4 dBm Radio, 20 m (Bluetooth Power Class 2) Bluetooth Spec: 1.0 B (1.12.1999) Flowcontrol credit based
Class 1 module:	RF part: +20 dBm Radio, 100 m (Bluetooth Power Class 1)
Bluetooth antenna:	internal or external via coax SMC connector

Physical dimensions:

BlueRS+Dx:	desktop casing: 71 x 22 x 123 mm (WxHxD)
BlueRS+Mx:	plug on module: 56 x 56 x 12s mm (WxHxD)

Power supply:

BlueRS+Dx:	external power supply 5V DC. idle: ca. 75 mA, active: ca. 115 mA.
BlueRS+Mx5:	5V DC, +-5%, via double pin row P2 idle: ca. 30 mA, active: ca. 70 mA.

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A2: LED displays BlueRS+ desktop models

Active states:

L1	L2	Status
⊖	⊖ (2sec)	Power-On-Phase ; Bootloader, Init active, wait
⊗	O	Ready, idle ; Initializing ok, no Bluetooth link established
∅	O	Ready, power down; Init ok, no Bluetooth link established
⊗	∅	Connecting ; Bluetooth link will be established
⊗	⊗	Connected ; Bluetooth link established

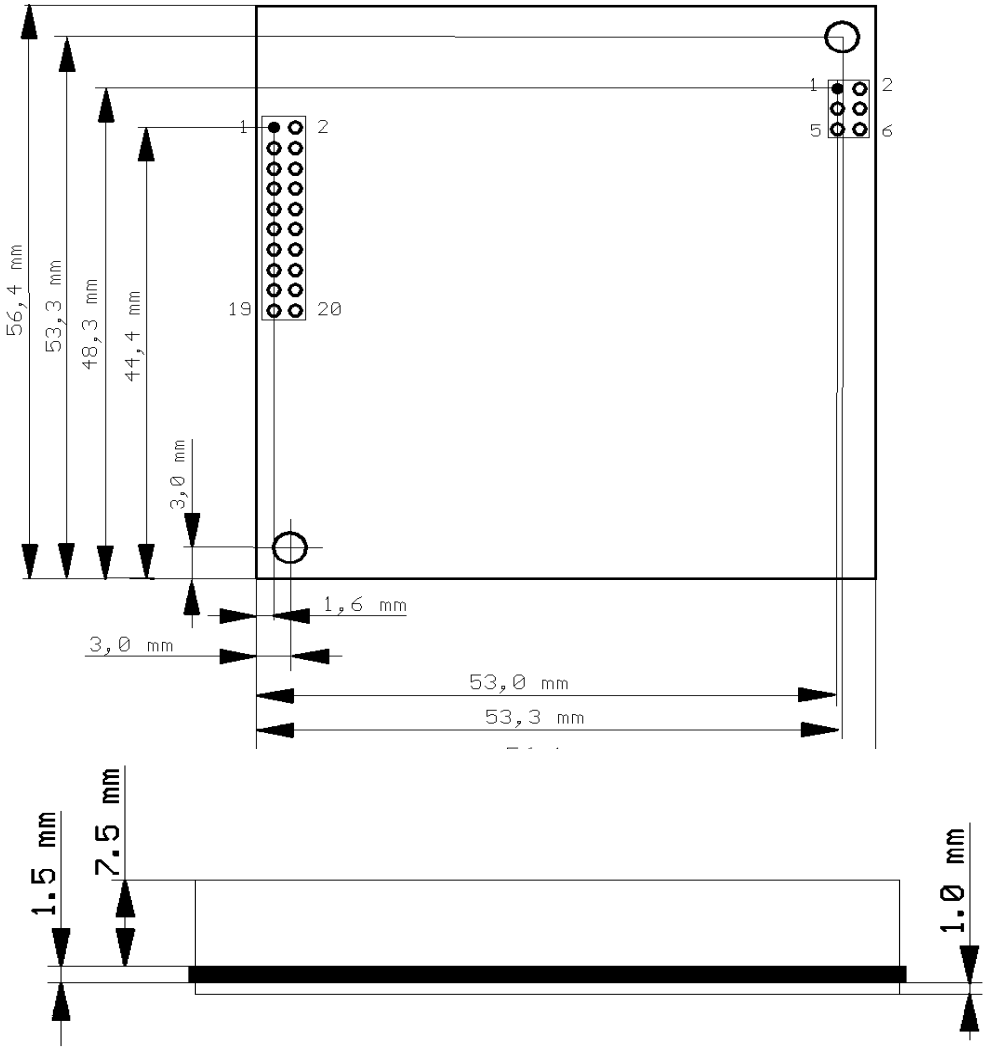
Error states:

L1	L2	Status
O	O	BlueRS+ not ok ; Hardware error, BlueRS+ repair necessary
O	⊖ (nx1s)	BlueRS+ not ok ; Hardware error, BlueRS+ repair necessary
⊖	⊖	L1, L2 flashing: Bootloader active, no operational firmware programmed. Use command at**flash to download firmware with 115200 Bd ,N81 (see page 34).

LED Legend:

⊗	On		
∅	occ	short on, long off	Cycle 1 to 2 sec
⊕	fl	long on, short off	Cycle 1 sec
⊖	(***n***x***m***s)	continuous blinking: ***n*** times every ***m*** seconds	
O	Off		

A3: Mechanical dimensions of the BlueRS+ module



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A4: BlueRS+ Serial Interface Connector P1

P1-Pin	Signal	Direction from BlueRS+	BlueRS+ usage	External interfacing
1	GND	I	0V-Power	0V Power supply
2	VCC	I	+5V-Power	+5V Power supply
3	GND		GND	GND
4	TXD~	I		
5	GND		GND	GND
6	RXD~	O		
7	ID2	O	GND	NC or READ
8	RTS~	I		
9	ID1	O	GND	NC or READ
10	CTS~	O		
11	RESET	I	RESET active low (OC)	NC
12	DTR~	I		
13	L3~ (UA0)	O	(internal 10k Pull up)	NC or status info
14	DCD~	O		
15	RI~	O		
16	DSR~	O		
17	UA~	O	User Output 1	NC or status info
18	UE~	I	User Input 1	10k Pull up
19	UA2	O	User Output 2	NC or status info
20	UE2	I	User Input 2	GND

Outputs:

UA: default: similar to L1 of BlueRS+Dx
L3: Bluetooth link established
UA2: reserved

Inputs:

UE: reserved
UE2: select DCE/DTE mode. GND=DCE mode.

Inputs and output lines with '~' are low active (i.e. ON has the TTL level 0VDC)

A5: BlueRS+ Interface Connector P2

If mounted:

P2-Pin	Signal	Direction
1	NC	-
2	NC	-
3	NC	-
4	NC	-
5	NC	-
6	NC	-

A6: Pinout of the V.24/V.28 interface BlueRS+ desktop models (DSUB 9)

Pin	V.24/V.28			I/O	TEXT
	ITU	DIN	EIA		
1	109	M5	DCD	O	Data carrier detect
2	104	D2	R D	O	Receive data
3	103	D1	T D	I	Transmit data
4	108/1 108/2	S1.1 S1.2	DTR	I	Data terminal ready
5	102	E2	GND	---	Signal ground
6	107	M1	DSR	O	Data set ready
7	105	S2	RTS	I	Request to send
8	106	M2	CTS	O	Clear to send
9	125	M3	RI	O	Ring indicator

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